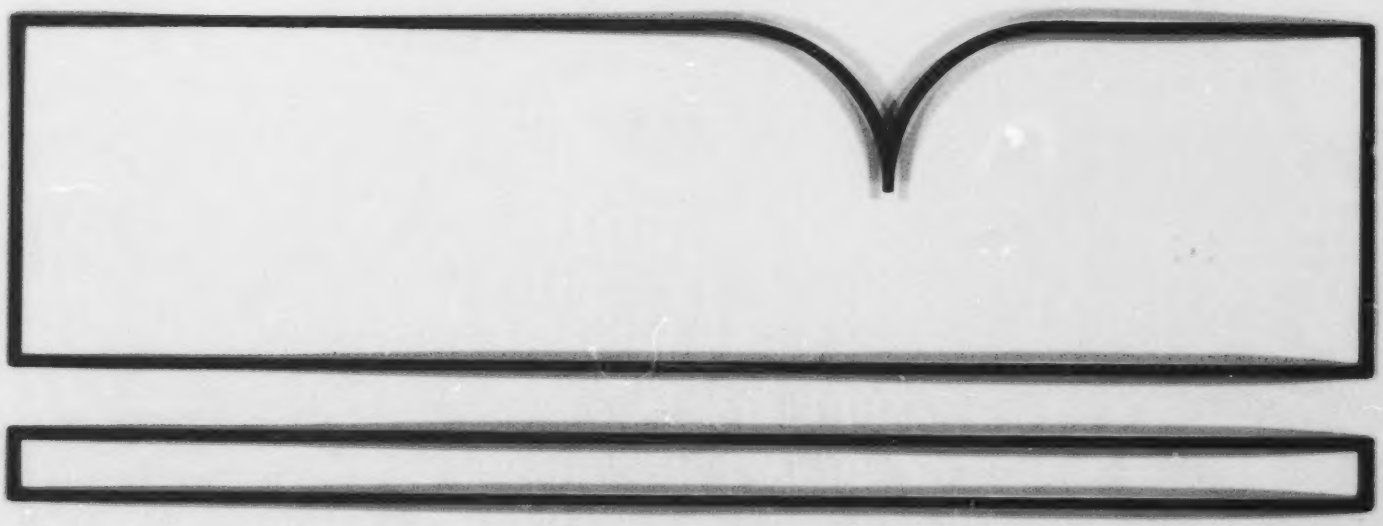
PB88-173000

Superfund Record of Decision (EPA Region 7) Minker/Stout/Romaine Creek Site, Romaine Creek Portion, Jefferson County, Missouri (Second Remedial Action), September 1987

(U.S.) Environmental Protection Agency
Washington, DC

28 Sep 87



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EPA/ROD/R07-87/007
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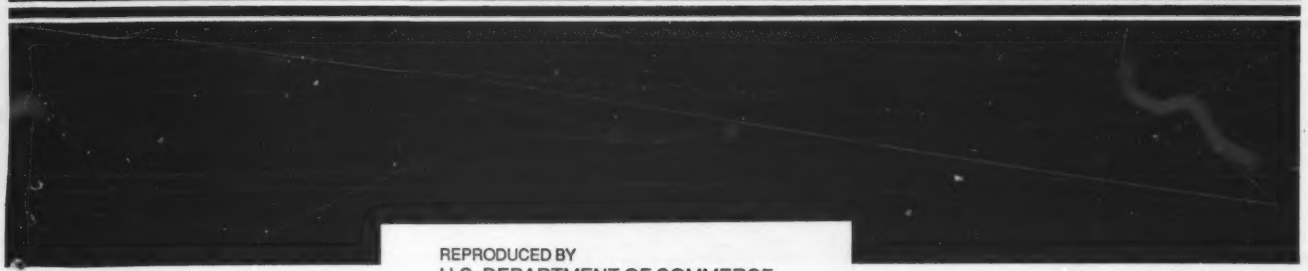
Superfund Record of Decision:

Minker Stout/Romaine Creek, MO



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Second Remedial Action

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16. ABSTRACT

The Romaine Creek portion of the Minker/Stout/Romaine Creek site is located in Jefferson County, Missouri, approximately 20 miles southwest of St. Louis. Romaine Creek starts at the Minker area and flows 4.6 miles to its confluence with Saline Creek. Romaine Creek is located in a rural residential area, and is not used for municipal, industrial or domestic purposes. In the late 1960s and early 1970s, a southwest Missouri chemical plant producing 2,4,5-T and hexachlorophene contracted a waste oil reclaimer to remove process residues. The residues, contaminated with 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) were mixed with waste oils and sprayed as a dust suppressant on a nearby horse arena. In March of 1973, the owner of the horse arena had the contaminated soils removed to various portions of the Minker/Stout/Romaine Creek site. Approximately 120 yd^3 of this soil was used as fill in a ravine on the Minker property, and since 1973, much has eroded into Romaine Creek. In 1982, contaminated soils above 1 ug/kg TCDD were excavated from the Minker portion of the site. The primary contaminant of concern is dioxin.

The selected interim remedial measure for the Romaine Creek portion of this site includes: excavation and temporary onsite storage of soils and sediments contaminated with greater than 1 ug/kg TCDD; and backfilling of the excavated areas with clean material suitable for the establishment of a natural stream bed. The estimated present worth cost for this remedial action is $4,488,000 with annual O&M of $28,000.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Minker/Stout/Romaine - Romaine Creek Portion, MO Second Remedial Action Contaminated Media: soil, sediment Key contaminants: dioxin		

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Record of Decision
Operable Unit Remedial Alternative Selection

SITE: Romaine Creek Portion of Minker/Stout/Romaine Creek NPL Site

DOCUMENTS REVIEWED

I am basing my decision primarily on the following documents describing the analysis of cost-effectiveness of operable unit remedial alternatives for interim management of dioxin-contaminated materials at the Romaine Creek portion of the Minker/Stout/Romaine Creek NPL site. Additional documents considered are included in the Administrative Record for this action.

- Operable Unit Feasibility Study - Romaine Creek Portion of the Minker/Stout/Romaine Creek Site.

- Summary of Remedial Alternative Selection - Romaine Creek Portion of the Minker/Stout/Romaine Creek Site.

- Responsiveness Summary - Operable Unit Remedial Actions for the Stout and Romaine Creek Portions of the Minker/Stout/Romaine Creek Site.

- Federal Position Statement on Dioxin in Missouri, Centers for Disease Control, December 7, 1982.

- Public Health Advisory for the Minker/Stout Sites, Centers for Disease Control, March 17, 1983.

- Addendum to March 17 "Public Health Advisory for the Minker/Stout Sites," Centers for Disease Control, April 7, 1983.

- Health Implications of 2,3,7,8-tetrachlorodibenzodioxin (TCDD) Contamination of Residential Soil, Kimbrough, R.D., et al., Journal of Toxicity and Environmental Health, 14:47-93, 1984.

- Memorandum, Review of Analysis Data for 2,3,7,8-TCDD in Romaine Creek Sediment and Biota, Jefferson County, Missouri, Stephen Margolis, Ph.D., to Edward J. Skowronski, Agency for Toxic Substances and Disease Registry, March 10, 1986.

DESCRIPTION OF SELECTED REMEDY

The selected operable unit remedial action alternative involves the excavation of soil and sediment in Romaine Creek contaminated with 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) at levels exceeding one part per billion (1 ppb). Contaminated materials will be excavated until a residual TCDD concentration of less than 1 ppb remains. Excavation will not continue beyond a depth of four feet, or once solid bedrock is encountered. Excavated materials will be containerized and placed in temporary onsite storage until a final management alternative is implemented. Storage structures for the excavated material will be constructed on the former Edwards property adjacent to

A

Romaine Creek. These storage structures will be designed and constructed in accordance with the substantive requirements for hazardous waste storage facilities under the Resource Conservation and Recovery Act, as amended. Following removal of contaminated material from Romaine Creek, excavated areas will be backfilled with clean material suitable for the establishment of a natural streambed.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, and the National Contingency Plan (40 CFR Part 300), I have determined that excavation and interim onsite storage of TCDD-contaminated materials at the Romaine Creek portion of the Minker/Stout/Romaine Creek site is cost-effective, consistent with a permanent remedy, and provides adequate protection of public health, welfare, and the environment. The remedy selection procedure and selected alternative comply with provisions of the Superfund Amendments and Reauthorization Act of 1986. The State of Missouri has been consulted and concurs with the selected remedy.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites. The selected operable unit remedial alternative is consistent with Section 300.68(c) of the National Contingency Plan, and is a component of a total remedial action which will attain all applicable or relevant and appropriate requirements for the protection of public health and environment.

9-28-87
Date

Regional Administrator

B

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
ROMAINE CREEK PORTION OF THE MINKER/STOUT/ROMAINE CREEK SITE
JEFFERSON COUNTY, MISSOURI

The purpose of this document is to state the interim remedy that the Agency has selected to implement at Romaine Creek. This document will also include a brief analysis of remedial action alternatives which have been evaluated leading to the Agency's decision of remedy preference.

An operable unit is defined as a discrete part of an entire response action for an uncontrolled hazardous waste site which functions to decrease a release, threat of release, or pathway of exposure of site hazardous substances. Operable units must be consistent with the final remedy for a site and must be cost-effective according to the provisions of SARA. It is assumed in this document that the final remedial action for the Romaine Creek operable unit will involve offsite management, which will require eventual excavation of contaminated soil and sediments.

SITE DESCRIPTION

The Romaine Creek portion of the Minker/Stout/Romaine Creek hazardous waste site is located in Jefferson County, Missouri, approximately 20 miles southwest of St. Louis. Romaine Creek starts at the Minker area and flows 4.6 miles to its confluence with Saline Creek. Saline Creek empties into the Meramec River 0.2 miles downstream.

Romaine Creek is located in a rural residential area. There are no businesses or industries located in the watershed, and the water is not used for municipal or industrial purposes.

There are some private wells in the area, but most residential water is indirectly supplied from St. Louis County Water Company. Due to its small size, and intermittent flow in the upper reaches, the creek is not used for domestic water supply.

The first mile of the creek has a moderate channel gradient and steep slide slopes, and the remainder of the creek has a moderate to low gradient and flatter side slopes. Approximately the upper half of the creek is dry much of the year.

SITE HISTORY

The Minker/Stout/Romaine Creek site was placed on the Environmental Protection Agency's (EPA) National Priorities List (NPL) of uncontrolled hazardous waste sites in 1983 because 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD) was detected in the soil. A historical investigation of the situation indicated the contaminants originated from a chemical plant in southwest Missouri, which produced hexachlorophene and 2,4,5-T in the late 1960's and early 1970's.

In 1971, a Missouri waste oil reclaimer was contracted to remove process residues contaminated with TCDD from a tank located at the southwest Missouri plant. This material was subsequently mixed with waste oils and sprayed as a dust suppressant on the Bubbling Springs Horse Arena near Imperial, Missouri. In March of 1973, the horse arena owner contracted with a local hauler for the removal of the contaminated soil from the arena. The arena was excavated and material was deposited at the various portions of the Minker/Stout/Romaine Creek site. Approximately 120 cubic yards of this excavated soil were placed as fill in a ravine at the Minker property. Since 1973, a significant quantity of the Minker fill has eroded into Romaine Creek.

Sampling for TCDD

The EPA initially sampled and analyzed Romaine Creek sediments for TCDD in 1982. Approximately 150 samples were collected from the Minker area to near the mouth of the creek. At a detection limit of approximately 1 ppb, TCDD was not detected beyond 6,000 feet downstream of the Minker area. Concentrations ranged from a maximum of 272 ppb near the Minker area to less than 1 ppb 7,400 feet downstream.

In 1985, biota and additional sediment samples were collected and analyzed by the EPA. Twelve sediment samples were collected, approximately one sample every half mile. TCDD was detected 1/2 mile downstream of the Minker area at concentrations as high as 36.3 ppb. (This was the closest sample to the Minker area.) The next sampling location which was 1-mile downstream of the Minker area, and all sample locations farther downstream had average TCDD concentrations of less than 1 ppb. (Detection limits were generally in the range of 0.10 to 0.20 ppb.) The sampling location farthest from the Minker area, 4.5 miles downstream, had an average TCDD concentration of 0.3 ppb; this indicates that a small amount of TCDD may be eroding to the mouth of the creek.

The 1985 biota sampling was conducted to determine if aquatic organisms in Romaine Creek and in Saline Creek below the Romaine Creek confluence had bioconcentrated TCDD. TCDD was detected in all the aquatic species sampled (fish, crayfish, amphipods). TCDD concentration was typically greater than 50 parts per trillion (ppt). Above Bubbling Springs, Romaine Creek is an intermittent stream and does not have sufficient aquatic habitat to support fish and crayfish.

Cleanup activity to date has included excavation of soils exceeding 1 ppb TCDD at the Minker area in 1986, which is the source of the Romaine Creek contamination. Warning signs have been posted along the contaminated portion of Romaine Creek. A state-issued fishing advisory is in effect for the Meramec River due to elevated levels of chlordane detected in fish samples collected from the river.

COMMUNITY RELATIONS HISTORY

Section 117 of SARA provides that notice must be published and a brief analysis of the proposed plan be made available to the public. A reasonable

opportunity for submission of oral and written comments must be provided. The opportunity for a public meeting near the site is required regarding the proposed plan. Any findings concerning compliance with federal and state cleanup standards must be provided to the public.

A public comment period was held for the Romaine Creek Operable Unit Feasibility Study (OUFS) and Proposed Plan from August 20 through September 21, 1987. A public meeting was conducted September 10, 1987, to discuss these documents and the Agency's tentatively selected alternative.

All documents released were made available for public inspection and copying at EPA Public Information Centers located on Lewis Road, immediately east of Times Beach, and at the intersection of Kiefer Creek Road and Ries Road in Castlewood (Ballwin), Missouri. These EPA information facilities provided the opportunity for public access to information six days a week. An onsite EPA public information center will be established and remain open during implementation of any remedial action at Romaine Creek.

The opportunity for public participation has been provided prior to and during all dioxin cleanup activities in Missouri since EPA began actively investigating potential Missouri dioxin sites in 1982. Cleanup activities to date have consisted of removal actions taken to reduce exposure to dioxin-contaminated soils by containment and by excavation and secure storage. Public meetings have been conducted prior to all removal activities implemented since 1984 to solicit public comments so that the Agency could be aware of and responsive to the public's concerns.

Cleanup measures being addressed in this document represent interim actions for the management of dioxin-contaminated sediments prior to final management. Final management of dioxin-contaminated materials is being addressed separately, and was evaluated in the Feasibility Study of Final Remedial Actions for the Minker/Stout/Romaine Creek site.

A public comment period was held for the Feasibility Study of Final Remedial Actions for the Minker/Stout/Romaine Creek Site from August 8, 1986, until September 5, 1986. A public meeting was held on August 25, 1986, at a local public facility in order to discuss the alternatives evaluated in the study and the Agency's proposed remedy. At the public meeting it was announced that the only alternative in the study which the Agency currently considered feasible to implement for final management of contaminated soils was offsite thermal treatment within 50 miles of the site. It was also announced that the State of Missouri had recommended and suggested the evaluation of Times Beach as a location for offsite thermal treatment, and that EPA was evaluating Times Beach as a possible location for siting a mobile thermal destruction unit. It was announced that a feasibility study to evaluate Times Beach as a potential location for offsite thermal treatment would be completed and released for public comment in January 1987.

ALTERNATIVES EVALUATION

SITE OBJECTIVES

General site-specific objectives are 1) to prevent or reduce long-term human contact with soils containing dioxin at concentrations exceeding

the action level which is determined to be protective of public health and 2) to minimize the potential for offsite migration of dioxin. Operable unit alternatives must be consistent with the final remedial action. An objective of all alternatives involving treatment is to achieve destruction and removal efficiencies (DRE's) which meet applicable or relevant and appropriate regulatory criteria.

The Romaine Creek Operable Unit Feasibility Study evaluates removal of soil and sediment exceeding an action level or target cleanup level of 1 ppb. Federal and state health officials have determined that 1 ppb in a residential area is a reasonable level at which to express concerns about public health risks. Complete removal of all contaminated soil and sediment was also evaluated.

DESCRIPTION OF ALTERNATIVES

A brief description of the operable unit alternatives is given in this section. Five alternatives have been given consideration for the interim remedy for Romaine Creek. Additional development, description, and evaluation of each alternative is presented in the Romaine Creek Operable Unit Feasibility Study.

Alternative 1: No Action

Under the no-action alternative, no additional remedial actions would be taken at Romaine Creek.

Alternative 2: Limited Action

Limited action would involve implementation of site-use restrictions, as deemed necessary and posting of warning signs along the full length of the creek, plus fencing at road crossings to limit public access. The alternative would also include annual monitoring of TCDD distribution within Romaine Creek and monitoring for TCDD in nearby selected wells.

Alternative 3: Stabilization

This alternative would include the same scope items as described for Alternative 2 plus the additional measures of quarterly monitoring and in-place stabilization of the sediments contaminated at levels greater than 1 ppb. Stabilization would be accomplished using vegetation and manufactured erosion control mats. As previously described, the reach of creek contaminated at levels exceeding 1 ppb lies within that portion which is dry much of the year.

Alternative 4: Excavation to 1 ppb and Storage

Alternative 4 would involve excavation and temporary onsite storage of all soils and sediments contaminated at concentrations exceeding 1 ppb,

and implementation of a monitoring program similar to Alternative 2. It is estimated that approximately 4,400 cubic yards of contaminated material would be removed and stored during implementation of this alternative. It is assumed that the excavated sediments would be stored in semibulk sacks placed in metal buildings, as has been done by the EPA during removal actions performed at other Missouri dioxin sites. A storage site was not selected; however, it was assumed that the site would be adjacent to the creek, protected from a 100-year flood, and that it would be relatively flat.

Alternative 5: Complete Excavation and Storage

Alternative 5 would involve excavation and temporary onsite storage of all sediments within Romaine Creek. A preliminary estimate made of the sediment volume that would be stored during implementation of this alternative is 50,000 cubic yards. Storage would be as described for Alternative 4.

EVALUATION OF ALTERNATIVES

The five operable unit alternatives considered in the detailed evaluation were compared to CERCLA criteria for the selection of remedy. These remedy selection criteria include the following:

- Compliance with ARARs
- Reduction of mobility, toxicity, or volume of waste
- Short-term effectiveness
- Long-term effectiveness
- Permanence
- Implementability
- Cost
- Community and state acceptance

Table I presents an evaluation of each alternative against these evaluation criteria. A discussion of each criteria and their attainment by each of the alternatives follows:

Compliance with ARARs

Section 121(d) of CERCLA, as amended by SARA, requires that remedial actions comply with requirements or standards under federal and state laws for the protection of public health and the environment. Section 121(d) allows a remedy to be selected that does not attain a level of control at

TABLE 1. REMEDY SELECTION CRITERIA - ROMAINE CREEK

ALTERNATIVE	COMPLIANCE WITH ARARs	REDUCTION OF MOBILITY, TOXICITY, OR VOLUME OF WASTE	SHORT-TERM EFFECTIVENESS	LONG-TERM EFFECTIVENESS
1: No Action	Consistent with complete remedy which complies with ARARS.	No reduction of mobility, toxicity, or volume. Some increase in contaminated sediment volume requiring future excavation may occur due to contaminant migration.	Risks to public health and the environment remain at current levels.	Existing contaminants would remain in place unless migration occurs. Risks to public health and the environment remain at current levels. Site boundaries may expand due to continued migration.
2: Limited Action	Consistent with complete remedy which complies with ARARS.	No reduction of mobility, toxicity, or volume. Some increase in contaminated sediment volume requiring future excavation may occur due to contaminant migration.	Low potential for exposure to community or environment in excess of current levels or exposure to workers during implementation. Implementation would require less than one year.	Monitoring program would detect contaminant migration. Fencing would control access to contaminated portion of stream. Low O&M requirements. Protection achieved immediately upon completion.
3: Stabilization	Consistent with complete remedy which complies with ARARS.	No reduction in toxicity. Volume of material requiring eventual excavation will increase due to volume of stabilization material. Mobility would be reduced and could be controlled with adequate maintenance.	Greater potential for exposure to workers and community relative to alt. 2 due to soil disturbance. Disturbance of wildlife and increased stream turbidity possible. Could be completed within 2 years.	Reduced potential for exposure to community and environment. Existing contaminants remain in place. High O&M requirements to maintain vegetation. Reliability of vegetative cover uncertain. Vegetation may be difficult to establish.
4: Partial Excavation	Consistent with complete remedy which complies with ARARS. Storage structures, designed and constructed to RCRA standards.	No reduction in toxicity. Mobility controlled by containerization and secure storage. Volume of contaminated sediment fixed at current level. Estimated 4,400 cy of material would require final management.	Increased potential for exposure to workers and community due to soil disturbance. Temporary wildlife disturbance and increased stream turbidity possible. Could be completed within 2 years.	Exposure potential reduced to residential standards. Stream levels permanently reduced to less than 1 ppb. Potential bioaccumulation in non-fishable stream. Protection achieved immediately upon completion. Limited O&M requirements for structures.
: Complete Excavation	Consistent with complete remedy which complies with ARARS Storage structures designed and constructed to RCRA standards.	No reduction in toxicity. Mobility controlled by containerization and secure storage. Volume of contaminated sediment fixed at current level. Estimated 50,000 cy of material would require final management.	Increased potential for exposure to workers and community due to soil disturbance. Temporary wildlife disturbance and increased stream turbidity possible. Implementation would require 3-4 years.	Exposure potential for community and environment eliminated. No residual contamination would remain. Potential bioaccumulation eliminated. Protection immediate upon completion. Limited O&M requirements for storage structures.

TABLE 1. REMEDY SELECTION CRITERIA - ROMAINE CREEK (cont.)

ALTERNATIVE	PERMANENCE	IMPLEMENTABILITY	COST	COMMUNITY AND STATE ACCEPTANCE
1: No Action	No direct impact on future management requirements. Volume of material requiring final management may increase or decrease due to contaminant migration.	n/a	Total present worth: $0 Annual O&M cost: $0	Community desires that Romaine Creek be cleaned up as soon as possible. State recognizes need to initiate action. No action not consistent with community and state sentiment.
2: Limited Action	No direct impact on future management requirements. Volume of material requiring final management may increase or decrease due to contaminant migration.	Straightforward implementation. Uncertain reliability due to unauthorized site intruders. Access to affected private properties would be required.	Total present worth: $211,000 Annual O&M cost: $21,000	Community may interpret as final action, and would object to implementation from asthetic standpoint. Limited Action not consistent with past state actions.
3 [illegible]bilization	Does not represent permanent fixation. Regular maintenance would be required to maintain the volume of soil requiring final management at current level. Increase in total volume due to stabilization materials.	Establishment of vegetation may be difficult in some areas. Erosion may occur during severe storms. Access to private properties would be required.	Total present worth: $937,000 Annual O&M cost: $37,000	Community may interpret as final action, and would object to need to access property and disturb creek twice. Not consistent with past state actions.
4: Partial Excavation	Permanently reduce levels in creek to below 1 ppb. Containerization would facilitate future handling.	Implementation facilitated by proper selection of equipment. Reliability of storage structures high. Access to private properties would be required.	Total present worth: $4,488,000 Annual O&M cost: $28,000	Community would support removal of contamination from creek, but may object to siting of storage structures. Consistent with past state actions.
5: Complete Excavation	Permanently remove existing contamination to background levels. Recontamination possible from Minker site. Containerization would facilitate future handling.	Removal of submerged sediments difficult. Dewatering necessary. Access to many private properties required. Reliability of storage structures high. Insufficient onsite area for required structures.	Total present worth: $27,900,000 Annual O&M cost: $22,000	Community would support removal of contamination from creek, but may object to siting of storage structures. Large number of required structures objectionable. Consistent with past state actions.

least equivalent to a legally applicable or relevant and appropriate requirement (ARAR) if the remedy selected is only part of a total remedial action that will attain such a level of control when completed. The operable unit alternatives evaluated in the feasibility study represent only part of the complete remedy for Romaine Creek. It is not necessary for these alternatives to comply with all ARARs. The alternatives will, however, be compared to ARARs and evaluated to determine the extent to which each is consistent with a final remedy which attains ARARs.

All alternatives evaluated are consistent with final remedial actions which involve treatment or disposal. A complete remedy involving the treatment or disposal of dioxin-contaminated soils and sediment would potentially meet all ARARs. The operable units evaluated are therefore consistent with complete remedies which meet ARARs.

The land ban regulations governing the land disposal of dioxin-contaminated wastes are expected to go into effect in November 1988. Final management of soils and sediments from Romaine Creek will not occur before that date. The land ban regulations state that dioxin-contaminated soils can be land disposed if they pass the Toxicity Characteristics Leaching Procedure (TCLP). Based upon existing sample results from Romaine Creek, it is expected that the excavated sediments would pass the TCLP test and be exempt from the dioxin land ban.

Permits are not required for onsite remedial actions at Superfund sites. Although formal permits are not required, any action must meet the substantive technical requirements of the permit process. Storage structures included in alternatives involving excavation and interim onsite storage of contaminated soils will be designed and constructed in compliance with the appropriate substantive requirements of the Resource Conservation and Recovery Act, as amended (RCRA).

Reduction of Mobility, Toxicity, or Volume of Waste

Section 121(b) of CERCLA, as amended, states that remedial actions involving treatment which permanently and significantly reduce the volume, mobility, or toxicity of hazardous materials are to be preferred over those not involving such treatment. This evaluation criteria relates to the ability of a remedial alternative to control or eliminate risks caused by the mobility, toxicity, or volume of a hazardous waste.

Alternatives 1 and 2 would have no direct impact on the mobility, toxicity, or volume of hazardous materials in Romaine Creek, however, failure to stabilize or contain dioxin-contaminated sediments may result in expanded site boundaries and an increased soil volume requiring future management.

Stabilization of contaminated areas in Romaine Creek would reduce the potential for erosion and transport which currently exists. Implementation of this alternative would result in an increase in the soil volume requiring future management due to the volume of stabilization material.

Alternatives involving the excavation and interim onsite storage of contaminated soils would result in decreased potential for migration. Mobility of excavated material would be eliminated due to containerization and secure storage. Migration of contamination not removed from the creek could continue to occur. Excavation of sediments exceeding 1 ppb would be expected to result in the permanent reduction of contaminant concentration in Romaine Creek sediment to levels below 1 ppb. It is anticipated that no subsequent excavation would be necessary to maintain sediment concentrations below 1 ppb. Complete excavation would remove all sediment from Romaine Creek, eliminating the potential for additional migration of existing contamination in Romaine Creek. As discussed later in this document, however, some degree of contaminant migration may occur from the adjacent Minker area, where soils exceeding 1 ppb TCDD were removed.

Short-Term Effectiveness

Short-term effectiveness measures how well an alternative provides protection of the environment, community, and workers during construction, and the time required for implementation.

Short-term risk to public health and the environment would remain at current levels for Alternative 1. However, there would be no increase in risk to workers due to construction activity or disturbance of contaminated soil. During implementation of Alternative 2, there would be low potential for exposure to workers and no significant increase in exposure to the community or environment. Stabilization of the creek bed would result in greater potential for worker exposure due to soil-disturbing activities. Soil disturbance would increase the potential for exposure to the community and could temporarily disturb wildlife and increase stream turbidity.

Excavation and interim storage of contaminated sediments would also involve soil disturbance and related exposure opportunities. This exposure potential could be mitigated by adequate dust control and monitoring.

Severe storms may spread contamination during implementation of stabilization or excavation activities. Complete excavation of Romaine Creek sediments would involve a larger area with greater opportunity for wildlife disturbance and community and worker exposure. Disturbance of submerged sediments during removal in the perennial reach of the stream would increase the turbidity of lower Romaine Creek and temporarily increase sediment loading into the Meramec River. Exposure potential would continue during dewatering of submerged sediments. The potential negative effects of these possible events could be minimized and controlled by design and implementation of protective measures such as daily cover of exposed areas and removal of submerged sediments during low-flow periods.

Long-Term Effectiveness

Long-term effectiveness addresses the long-term protection and reliability that an alternative affords. This includes the risk to the community once the remedy is in place, risk to workers during operation and maintenance

(O&M), environmental risk due to residual hazardous substances, long-term reliability, O&M requirements, time required to achieve protection, and the difficulty in detecting and mitigating problems with the completed remedy.

Existing contamination would remain in place for the no-action and limited-action alternatives. Site boundaries could potentially expand due to contaminant migration through erosion. If this occurred, the resulting increased volume of contaminated sediment would increase the scope and cost of future management. Excavation of sediments in the perennial portion of the stream would be much more difficult than in the intermittent section, if migration occurred to that extent.

Limited action would provide a monitoring program to detect the spread of contamination, and fencing to control access to contaminated portions of the creek. Fencing and posting of the creek may not prevent all site intruders from access. Limited action would have low O&M requirements, could be easily inspected, and repairs would be straightforward. Limited action would achieve its full degree of protection immediately upon implementation of the remedy, as would all of the alternatives evaluated.

Stabilization of the creek would reduce exposure potential to the community and environment by controlling dispersion of contaminated soil due to erosion by wind and water. Existing levels of contamination would remain in place. Bioaccumulation could continue to occur at a reduced rate. Operation and maintenance requirements would be substantial in order to maintain vegetation in all contaminated portions of the creek. Quarterly O&M may not be sufficient to maintain vegetation in some areas. Ineffectiveness of the stabilization could result in migration of contaminants, expanded site boundaries, and increased sediment volumes requiring future management. Workers performing O&M activities could potentially be exposed to elevated levels of TCDD. If contaminants exceeding a level of concern were transported to the perennial portion of the creek, excavation would be more difficult.

Excavation of contaminated sediment exceeding 1 ppb would reduce exposure potential to residential standards. Bioaccumulation of TCDD in biota could potentially continue to occur following excavation of sediments exceeding 1 ppb, but the rate of bioaccumulation would be expected to be substantially reduced from current levels. It is expected that reduction of contaminant levels in Romaine Creek to levels below 1 ppb would result in a reduction in contaminant levels in Romaine Creek biota. At the present time, bioaccumulation of dioxin in biota does not represent a significant risk to human health, since Romaine Creek and the extreme lower portion of Saline Creek do not support private or commercial fishing. Romaine Creek waters eventually reach the Meramec River, which currently has a state-issued fishing advisory in place due to elevated levels of chlordane detected in Meramec River fish. Contaminated biota in Romaine Creek and the Meramec River are therefore not expected to enter the human food chain or represent a current risk to public health.

Limited O&M requirements would be associated with maintaining the storage structures for both excavation alternatives. There would be no O&M requirements for the creek, although annual monitoring of the area is included in the

partial excavation alternative evaluated in the OUFS. Problems with the remedy could easily be detected during inspection of the storage structures and repaired. The risk of system failure is very low.

Excavation and interim onsite storage of all sediments in Romaine Creek would provide the maximum degree of long-term protection to public health and the environment of the alternatives evaluated. No residual contamination would remain in the creek. Exposure potential for the community and environment and the potential for bioaccumulation in the creek would be eliminated. Contaminant concentrations in affected biota would be expected to eventually return to background levels if no recontamination of the creek occurred. Limited O&M requirements would be associated with the storage structures. Problems with the remedy could be easily detected during inspection and repaired.

Permanence

The criteria of permanence is similar to long-term effectiveness, but with an emphasis on the need for management of treated residuals and untreated wastes. The operable unit alternatives evaluated represent interim measures which can be implemented prior to final management of the contaminated soils. Permanence of each operable unit alternative concerns the extent to which future management of contaminated soils will be necessary.

No action and limited action will not control migration of contaminated sediments, which could result in expanded site boundaries. A removal action involving excavation of dioxin-contaminated soils exceeding 1 ppb has been completed at the Minker portion of the Minker/Stout/Romaine Creek site, which was the primary source of contamination into Romaine Creek. It is therefore likely that dioxin concentrations in upper Romaine Creek will decline due to the erosion of contaminated sediments to downstream areas.

Implementation of the no-action and limited-action alternatives will have no direct impact on future management requirements, although the volume of sediments requiring management could either decrease due to washout of contaminated areas or increase due to downstream migration of contamination.

Stabilization could be effective at controlling migration of contaminated sediment, thereby fixing the volume of sediment which is contaminated in excess of 1 ppb at the current level. There would be some increase in future management requirements due to the need to manage the stabilization materials.

Partial excavation of sediment is expected to result in the permanent reduction of contaminated levels to below 1 ppb. Future management of soils would be facilitated due to containerization of wastes. Complete excavation of contaminated sediments would permanently remove all existing contamination from Romaine Creek, but residual contamination at levels less than 1 ppb may continue to erode from the Minker area into Romaine Creek. It is not expected that this migration will result in recontamination of the creek to levels exceeding 1 ppb.

Implementability

This criteria measures the technical difficulties, reliability, and availability of each alternative. Implementability also involves the administrative feasibility of each alternative. No permits would be required for any of the actions evaluated since CERCLA onsite actions are exempt from permitting requirements by law.

The implementability criteria does not apply to the no-action alternative, since no measures would be taken to mitigate the contamination. Implementation of limited action would be straightforward. Access to private properties adjacent to the affected portion of the stream would be required, and may in some cases be difficult to obtain. The reliability of the limited action alternative is not certain. Site intruders could ignore warning signs and scale or avoid fences. Contamination may migrate downstream resulting in additional areas requiring access restrictions.

Stabilization of contaminated areas would be more difficult to successfully implement than the no-action or limited-action alternatives. Many contaminated areas may not support vegetation. The reliability of stabilization would be impacted by severe storms which could disrupt the stabilized areas. Access to private properties adjacent to contaminated portions of Romaine Creek would be required and may be difficult to obtain. The construction of access roads would be required along the length of the creek impacted for stabilization, and also for partial excavation and complete excavation alternatives. This may increase the difficulty in obtaining access from adjacent property owners.

Implementation of the partial excavation alternative could be facilitated by appropriate construction techniques. Vacuum equipment could be used to selectively remove pockets of sediment disposition within the creek. The reliability of partial excavation would be very high upon completion. The storage structures would last indefinitely if properly maintained.

Implementation of the complete excavation alternative would be more difficult since submerged sediment would be removed from the creek. Dewatering of the dredged sediment would be a complex operation probably requiring several acres of land currently in private ownership. Difficulty would be expected in obtaining access on private property for construction of access roads, excavation activities, and dewatering.

Cost

The total present worth cost of each alternative is presented in Table I. Costs listed for Alternatives 4 and 5 involving excavation and interim storage include the cost of removal and decontamination of the storage structures upon implementation of final management of sediment. Also included in Table I is the estimated annual Operation and Maintenance (O&M) cost associated with each alternative.

Community and State Acceptance

During past public meetings conducted for other portions of the Minker/Stout/Romaine Creek site and other nearby dioxin sites, the community was given the opportunity to express their preference for management of contaminated soils. Affected residents are in general agreement that the contaminated soil should be excavated and transported offsite for treatment or disposal. At the present time, there is no offsite treatment or disposal facility capable of managing the dioxin-contaminated sediments. Interim storage is therefore necessary until an offsite management option develops. The community is likely to be supportive of excavation of contaminated sediment and removal of the associated risk to public health. Given the absence of an offsite management option, the public will probably accept interim storage as the only alternative available at this time. Interim storage is consistent with the community supported final management option of offsite treatment or disposal. Some local objection can be expected near the location where the required storage structures are sited.

Several removal actions have been completed in the recent past involving excavation and interim storage of contaminated soils at nearby Eastern Missouri dioxin sites. The State of Missouri has in the past been supportive of these actions if they achieve adequate protection of public health and the environment. During the public comment period, the state expressed its support for the excavation and interim storage of sediments exceeding 1 ppb in Romaine Creek.

SELECTED REMEDY

DESCRIPTION OF THE SELECTED REMEDY

The interim remedy which the Agency will implement as an operable unit remedial action involves excavation of creek sediments exceeding 1 ppb 2,3,7,8 TCDD. This remedy is developed and described in detail as Alternative 4 in the Romaine Creek Operable Unit Feasibility Study.

Excavation of Romaine Creek soils and sediments exceeding 1 ppb will be performed using vacuum equipment, or other appropriate means of selectively removing pockets of potentially contaminated sediment deposition. An effort will be made to minimize the amount of material removed from Romaine Creek, while maintaining the assurance that soils and sediment exceeding 1 ppb are not left in place. Minimizing the volume of sediment removed from Romaine Creek limits the extent of environmental disturbance within the creek. Minimizing the removed sediment volume also reduces the required interim storage space and associated final management costs for the removed material. Any identified technology or procedure capable of reducing the amount of material removed from Romaine Creek will be investigated during the design phase. These technologies include, but are not limited to, innovative excavation techniques and particle separation technologies capable of separating the contaminated fine materials from uncontaminated rocks and other coarser materials.

All concentrations within Romaine creek will be determined at the 95 percent confidence level using the procedure developed in 1984 for cleanup of other eastern Missouri dioxin sites. This procedure has undergone peer review and approval by Federal and State health agencies including the Centers for Disease Control/ Center for Environmental Health, Environmental Protection Agency, Missouri Division of Health, and the Missouri Department of Natural Resources. This procedure determines the maximum surface contaminant level in unit areas of approximately 5,000 square feet or smaller at the 95 percent confidence level.

Excavated soil and sediment will be containerized in woven polypropylene, polyethylene-lined bulk handling sacks similar to those currently and previously in use at eastern Missouri dioxin sites, including the Minker, Cashel, and Sullins portions of the Minker/Stout/Romaine Creek site. These bulk-handling sacks will be loaded by hopper and transported to fully enclosed, temporary storage structures constructed onsite. Storage structure design will be similar to those in use at other eastern Missouri dioxin sites. One 50-foot by 100-foot building has a capacity of approximately 1,100 cubic yards of containerized material. It is estimated that up to four such structures will be required to store the volume of contaminated material anticipated to be removed from Romaine Creek. Storage structures for contaminated material excavated from Romaine Creek will be located on the former Edwards property. The storage structures will be protected from flooding, and an effort will be made to minimize their adverse aesthetic impact.

Excavated materials will be placed in interim storage until a final management option can be selected. If a final management alternative becomes available and is selected in a separate Record of Decision for material removed from Romaine Creek, it is possible that interim storage of the excavated material will not be necessary, and that contaminated soil and sediment can be taken directly to the location where final management is available. This decision would be documented in a subsequent Record of Decision for final management of dioxin-contaminated materials from the Minker/Stout/Romaine Creek site.

The interim remedy also includes a provision for annual monitoring. This monitoring will verify that the interim remedy remains protective of public health and the environment. Contaminant levels will be monitored in sediment and biota. Area wells will also be sampled to confirm that area groundwater used for domestic purposes does not become contaminated. If TCDD levels are consistently below a level of concern for public health and the environment, this monitoring may be discontinued.

RATIONALE FOR PREFERENCE

The selected interim remedy is preferred over the no-action and limited-action alternatives primarily because leaving contaminated sediment in place does not provide adequate protection of human health or the environment. Access to contaminated portions of the creek by nearby residents or visitors would not be prevented by either no-action or limited-action alternatives. Exposure via direct contact and ingestion would continue to occur in excess of a level of concern for protection of human health in residential areas recommended by federal and state health agencies.

Naturally occurring erosion processes would be expected to gradually reduce contaminant levels in Romaine Creek. This erosion would result in the more highly contaminated sediment being transported downstream where it could become available to additional environmental and human receptors. Existing contaminant levels in Romaine Creek are too high to allow natural erosion processes to transport contaminated sediment downstream in an unmanaged process. It is expected that natural attenuation of contaminant levels to a level considered protective of public health and the environment could potentially take many years. Exposure of the public and environmental receptors to levels considered unsafe could continue until sediment concentrations are greatly reduced. Allowing natural processes to reduce sediment concentrations does not provide adequate protection of human health or the environment.

Stabilization of contaminated sediments is not being proposed due to the uncertainty of successful implementation, high O&M requirements, and because final management of the contaminated sediments would involve future construction activities which would disturb the creek and adjacent property owners along the contaminated portion an additional time. Difficulty may be encountered in acquiring easements or other types of access to private properties in order to perform regular maintenance. Excavation of contaminated sediments would permanently remove contaminants from Romaine Creek and eliminate the need to perform additional construction activities prior to final management of contaminated sediment.

STATUTORY DETERMINATIONS

Removal and temporary onsite storage of soils and sediment exceeding 1 ppb in Romaine Creek attains the objectives of the interim remedy and satisfies the remedy selection criteria. The objectives of the interim remedy identified in the Romaine Creek Operable Feasibility Study are to protect human health and the environment, provide compatibility with potential final remedial actions, and be cost-effective. Protection of human health and the environment is provided by mitigating the potential for human and environmental contact with contaminated sediment and reducing the potential for continued downstream erosion of contaminated sediments. The proposed interim remedy attains protectiveness objective by isolating the containerized contaminated sediment in a secure storage facility, thereby eliminating the potential for human or environmental contact with contaminated material exceeding 1 ppb TCDD. Some migration of sediments left in place at concentrations less than 1 ppb may continue to occur, but this migration is not expected to result in the development of contaminant levels exceeding a level of concern for protection of public health and the environment in the creek. It is anticipated that natural degradation and erosion processes will result in the gradual reduction of contaminant levels in the creek to near background levels.

The selected interim remedy also attains the objective of compatibility with final remedies. The interim remedy is compatible with potential offsite treatment or disposal options. Future handling of the contaminated material will be facilitated by containerization. The interim remedy is

not compatible with final remedial action alternatives involving in-place containment or treatment. In-place alternatives, however, do not compare favorably to offsite alternatives for final management of contaminated sediment, and have not been recommended by the Agency for implementation at Romaine Creek.

Although a final remedy has not been selected for contaminated soils and sediment from the Minker/Stout/Romaine Creek site, the Agency has proposed offsite thermal treatment for final management of this material. This proposed final remedy is supported by SARA, which establishes a statutory preference for remedies which utilize treatment technologies that result in the permanent reduction in toxicity, mobility, or volume of the hazardous material.

The selected remedy has been determined to be the most cost-effective operable unit remedial alternative which provides protectiveness. Only the two removal alternatives evaluated will assure the continued protection of public health and the environment. Complete excavation of all sediments in Romaine Creek cannot be justified at the additional cost because both removal alternatives reduce TCDD concentrations below 1 ppb which assures protection of public health and the environment. Complete excavation of sediments would result in excessive disruption of the environment along the entire length of Romaine Creek and would be very difficult to implement.

Removal of all sediment in Romaine Creek may not permanently remove all contamination from the streambed since soil with TCDD concentrations less than 1 ppb may continue to erode into the creek from the Minker area. The 1 ppb action level utilized during the cleanup of the Minker area does provide protection of human health in Romaine Creek, where consumption of contaminated biota is not expected to represent an additional public health risk. The Missouri Department of Conservation has stated Romaine Creek does not support fishing and adjacent residents have confirmed this by reporting that no fishing has been observed. Romaine Creek flows into Saline Creek 0.2 miles upstream of the Meramec River. The Meramec River is currently under a state-issued fish advisory due to elevated chlordane levels in the fish. TCDD levels detected in Meramec River biota to date have not, however, exceeded a Food and Drug Administration (FDA) advisory level for consumption of fish from the Great Lakes of 50 parts per trillion (ppt). Consumption of contaminated fish from Romaine Creek or the Meramec River is therefore not expected to be a significant pathway of human exposure.

Removal of soil exceeding 1 ppb at the Minker area has eliminated the source of highly contaminated sediment into Romaine Creek. It is anticipated that following removal of sediment exceeding 1 ppb in Romaine Creek, residual contaminant levels in the creek will gradually decline due to naturally occurring degradation and erosion processes. The selected interim remedy includes annual monitoring of Romaine Creek following removal of sediments exceeding 1 ppb in order to monitor residual contaminant levels and detect any potential migration or accumulation of contaminated sediments. It is anticipated that contaminant levels will gradually return to background.

Bioaccumulated contaminant levels in biota are expected to decline following removal of sediment exceeding 1 ppb. As residual sediment concentrations are further reduced through natural processes, a corresponding decline in biota contaminant levels is expected. Annual monitoring of sediment and biota will monitor the reduction in contaminant levels following implementation.